

Note: v.e⁻ will be used as an abbreviated form of "valence electron".

SCH4U - Lewis Structures Worksheet

After carefully reviewing the rules for drawing Lewis Structures, complete the structures for each of the following molecules.

Molecular Compounds	Total number of valence electrons	Skeleton of Lewis structure + v.e ⁻ on surroundings.	Number of valence electrons left	Lewis structure
SiCl ₄	Si : 4 v.e ⁻ Cl : 7 v.e ⁻ Total: 1x4 + 4x7 = 32	<pre> :Cl: :Cl - Si - Cl: :Cl:</pre>	#v.e ⁻ used = 32 #v.e ⁻ left = 32 - 32 = 0	<pre> :Cl: :Cl - Si - Cl: :Cl:</pre>
CF ₄	C : 4 v.e ⁻ F : 7 v.e ⁻ Total: 4 + 4x7 = 32	<pre> :F: :F - C - F: :F:</pre>	#v.e ⁻ used = 32 #v.e ⁻ left = 32 - 32 = 0	<pre> :F: :F - C - F: :F:</pre>
SbCl ₃	Sb : 5 v.e ⁻ Cl : 7 v.e ⁻ Total: 5 + 3x7 = 26	<pre> :Cl: :Cl - Sb - Cl: :Cl:</pre>	#v.e ⁻ used = 24 #v.e ⁻ left = 26 - 24 = 2	<pre> :Cl: :Cl - Sb - Cl: :Cl:</pre>
OF ₂	O : 6 v.e ⁻ F : 7 v.e ⁻ Total: 6 + 2x7 = 20	<pre>:F - O - F:</pre>	#v.e ⁻ used = 16 #v.e ⁻ left = 20 - 16 = 4	<pre>:F - O - F:</pre>
CS ₂	C : 4 v.e ⁻ S : 6 v.e ⁻ Total: 4 + 2x6 = 16	<pre>:S - C - S:</pre>	#v.e ⁻ used = 16 #v.e ⁻ left = 16 - 16 = 0 [C does not have 8 v.e ⁻]	<pre>:S = C = S:</pre>

multi-center compounds:

SO ₃	S: 6 v.e. O: 6 v.e. Total: 6 + 3x6 = 24	$\begin{array}{c} :\ddot{\text{O}}: \\ \\ :\ddot{\text{O}} - \text{S} - \ddot{\text{O}}: \end{array}$	#v.e. used = 24 #v.e. left = 24 - 24 = 0 <i>[S does not have 8 v.e.]</i>	$\begin{array}{c} :\text{O}: \\ \\ \ddot{\text{O}} = \text{S} = \ddot{\text{O}} \end{array}$ <i>extended octet.</i>
BeCl ₂	Be: 2 v.e. Cl: 7 v.e. Total: 2 + 2x7 = 16	$:\ddot{\text{Cl}} - \text{Be} - \ddot{\text{Cl}}:$	#v.e. used = 16 #v.e. left = 16 - 16 = 0	$:\ddot{\text{Cl}} - \text{Be} - \ddot{\text{Cl}}:$ <i>incomplete octet</i>
AsF ₅	As: 5 v.e. F: 7 v.e. Total = 5 + 5x7 = 40	$\begin{array}{c} :\text{F}: \\ \\ :\text{F} - \text{As} - \text{F}: \\ \\ :\text{F}: \end{array}$	#v.e. used = 40 #v.e. left = 40 - 40 = 0	$\begin{array}{c} :\text{F}: \\ \\ :\text{F} - \text{As} - \text{F}: \\ \\ :\text{F}: \end{array}$ <i>extended octet</i>
BrF ₃	Br: 7 v.e. F: 7 v.e. Total = 7 + 3x7 = 28	$\begin{array}{c} :\text{F} - \text{Br} - \text{F}: \\ \\ :\text{F}: \end{array}$	#v.e. used = 24 #v.e. left = 28 - 24 = 4	$\begin{array}{c} :\text{F} - \text{Br} - \text{F}: \\ \\ :\text{F}: \end{array}$
CH ₃ CCH	C: 4 v.e. H: 1 v.e. Total: 3x4 + 4x1 = 16	$\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\ \quad \quad \\ \text{H} \end{array}$ <i>central atom 1</i> <i>central atom 2</i> <i>central atom 3</i>	#v.e. used = 12 #v.e. left = 16 - 12 = 4 <i>Put all 4 on central Carbon 2 or 3.</i>	$\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{C} \equiv \text{C} - \text{H} \\ \\ \text{H} \end{array}$
CH ₃ COOH	C: 4 v.e. H: 1 v.e. O: 6 v.e. Total: 2x4 + 4x1 + 2x6 = 24	$\begin{array}{c} \text{H} \quad :\ddot{\text{O}}: \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{O} - \text{H} \\ \quad \quad \\ \text{H} \end{array}$ <i>central atom 1</i> <i>central atom 2</i> <i>central atom 3</i>	#v.e. used = 20 #v.e. left = 24 - 20 = 4 <i>distribute to most electronegative central atom first.</i>	$\begin{array}{c} \text{H} \quad :\text{O}: \\ \quad \\ \text{H} - \text{C} - \text{C} - \ddot{\text{O}} - \text{H} \\ \\ \text{H} \end{array}$